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## **Concussion of the labyrinth caused by shock of high potential electric current**

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**CONCUSSION OF THE LABYRINTH CAUSED BY SHOCK OF  
HIGH POTENTIAL ELECTRIC CURRENT.**

By DR. F. ROHRER,

Docent der Ohrenheilkunde an der Universität Zürich.

CONCUSSION of the labyrinth of the ear and of the auditory nerve can be produced by traumatism, by sudden compression of the air in the external meatus, or by the impact of a loud sound or the accumulative effect, if repeated, of feeble sounds. We know very well the different signs of this grave and painful state, and also we infer the affection of the internal ear in relation to the concussion of the whole skull, brain, os petrosum and labyrinth, directly or secondarily, by compression of the endolymph in consequence of the centripetal motion from the apparatus of the conduction of the sound.

I have never met with any mention of concussion of the labyrinth caused by the influence of high potential electric current, but we can readily understand such an occurrence in view of the deadly consequences following such a kind of trauma. Now, I happened to see and to treat a man who came in contact with electric current of high potential, of a strength of about 250 volts and a strain of 40 to 45 ampères. The man was placed on an electric crane, and, slipping, he seized a conducting cable-cord. Immediately he felt a terrible shock of his whole body, and fell. He lost speech, and could cry out only with full lungs. For five minutes the poor man was fixed on the cable in this dreadful condition, and was nearly dead. At last one of his fellow-workmen came to the

central stage where the dynamo was, and stopped it. When taken down from the high electric crane by his comrades, for half an hour the man was unable to walk or to stand. He had a headache, and was dizzy, and swayed as though he were tipsy. The dizziness was associated with a sense of oppression on the head and noises in both ears. This state of giddiness lasted three or four weeks, and the loss of the static sense was accompanied with neurasthenic signs, so that a *traumatic neurosis* was present. The patient lost his appetite and acute rhino-pharyngitis occurred; the tonsils became swollen, respiration was difficult, he snored, and every morning epistaxis appeared for several minutes, and the memory diminished to a state of "aproxexia." The accident occurred December 28, 1900, and the patient was under the treatment of the doctor of the works until January 14, 1901. The hearing was a little diminished and veiled, but I found at this time audition for the whispering voice, 3 metres, and conversation voice, 6 metres, for both ears. The patient looked disturbed, weak, and nervous—"facies nervosa."

High sounds were heard very easily. Galton's whistle 15 and König's rods to  $U^9$  on both the ears. Also deep sounds were normally heard from 12 to 36 vibrations by bone-conduction from the skull, and by air-conduction near the meatus from 14 to 36 vibrations on both sides tested by Appunn's contra-bass tuning-fork. Weber's test was indifferent, no lateralization, and the duration of perception by bone-conduction was diminished.

		<i>By Patient.</i>		<i>Normal.</i>	
Vibrations	4,096 c5	=10	seconds	...	6 seconds.
"	2,048 c4	=16	"	...	18 "
"	1,024 c3	=16	"	...	18 "
"	512 c2	=16	"	...	26 "
"	256 c1	=12	"	...	11 "
"	128 c	=10	"	...	12 "
"	1,024 c3	=22	"	...	20 "
"	440 a1	=31	"	...	41 "
"	264 c1	=14	"	...	23 "
"	110 A	=21	"	...	55 "
"	64 C-1	=18	"	...	40 "

*Gelle's Centripetal  
Compression.*

		<i>Air- conduction.</i>		<i>Bone- conduction.</i>	
Left ear	...	...	+	:	+
Right ear	...	...	+	:	+

*Stopped Organ-pipes.*

880 vibrations a2=f5 5,632 vibrations.					
Left ear	...	+	:	+	
Right ear	...	+	:	+	

My treatment consisted in pneumatic applications with Politzer's proceeding, catheterism, Delstanche's rarefacteur, feeble galvanic constant current (cathodal current) of 5 to 7 milliampères, injections of warm salt water in the aural meatus and in the nose, and in the "galvano-caustic puncture" over retro-auricular parts of the processus mastoideus on both sides and on the neck. The latter proceeding I have practised for more than fifteen years, with remarkable results as a derivative of powerful effect, and mainly to combat giddiness from different causes. Also in this case the vertigo passed away gradually after some days, and the "facies nervosa" became a visage of normal aspect. Laxatives and warm foot-baths aided the cure, and in two weeks the man resumed his work in the electric works. The reflexes of the pupils, of the facial nerve, and of the patellar-cubital and nuchal tendons were perfectly normal. The tuning-forks gradually showed an increase in bone-conduction. On February 9 they were as follows :

c5	=15	seconds	time	of	perception.
c4	=16	"	"	"	
c3	=18	"	"	"	
c2	=20	"	"	"	
c1	=11	"	"	"	
c	=13	"	"	"	
c3	=25	"	"	"	
a1	=32	"	"	"	
c1	=19	"	"	"	
A	=34	"	"	"	
C-1	=24	"	"	"	

I think that this case is interesting enough to be published, for the possibility of seeing similar patients grows with the increase of electric installations producing high potential currents, and with the frequency of the accidents due to the influence of this powerful phenomenon of nature. The alteration of the ear by this kind of "commotio labyrinthi" consists either in a tetanic concussion of the endings of the acoustic nerves, or in consecutive paralysis and torpor of the central fibres and origin of the acoustic centres in the brain. The vertiginous signs, similar to "Ménière's symptom-complexus," must be produced by a strong disturbance of the semi-circular canals and ampullæ, in grave cases with bleeding in the membranous parts. To the local troubles must be added the general disturbance of the whole nervous system, in the form of "traumatic neurosis" and dysthymia of the body and of the various functions.